RV Littorina 04/12 (1)

Cruise Report

Sagasbank (Mecklenburg Bay, Baltic Sea)

2nd – 5th April 2012

Institute of Geosciences (IfG),
Sedimentology, Coastal and Continental Shelf Research
Christian-Albrechts-University (CAU), Kiel

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Kiel, April 2012

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1. Introduction

This cruise with the RV LITTORINA was the first of three planed legs to be carried out in the area of the Sagasbank (Mecklenburg Bay).
Sagas-Bank is an elevation east of the Wagrian peninsula with several elevations of up to 8 meters below sea level (Figure 1). The center of Sagasbank is marked by the 10 m contour line. Sagasbank and the adjacent submarine areas (in total 3.238 km²) are declared as FFH-site (flora-fauna-habitat).
Residual sediments (boulders, blocks, sand and gravel) of the last glacial period are ideal habitat for submarine flora and benthic organisms. Here, 115 macro-zoobenthic species (with at least 20 red list species) and 17 algae species (with 6 red list species) are living on Sagasbank. The shallow water area is also habitat for porpoises and one of the most important bird resting places in the Baltic Sea. The habitat is exposed to fishing industry, military and sporting and leisure activities.
This cruise is part of cooperation between the Institute of Geosciences at the University of Kiel and the local authority 'Landesamt für Landwirtschaft, Umwelt und ländliche Räume' (LLUR). The aim of this cruise (and the following two) is a full coverage, hydroacoustic mapping of Sagasbank and the surrounding area. The hydroacoustic data are calibrated by grab sampling and under water videos. Of special interest are the regions covered with hard substrate providing habitat for macro-zoobenthos and fishes.

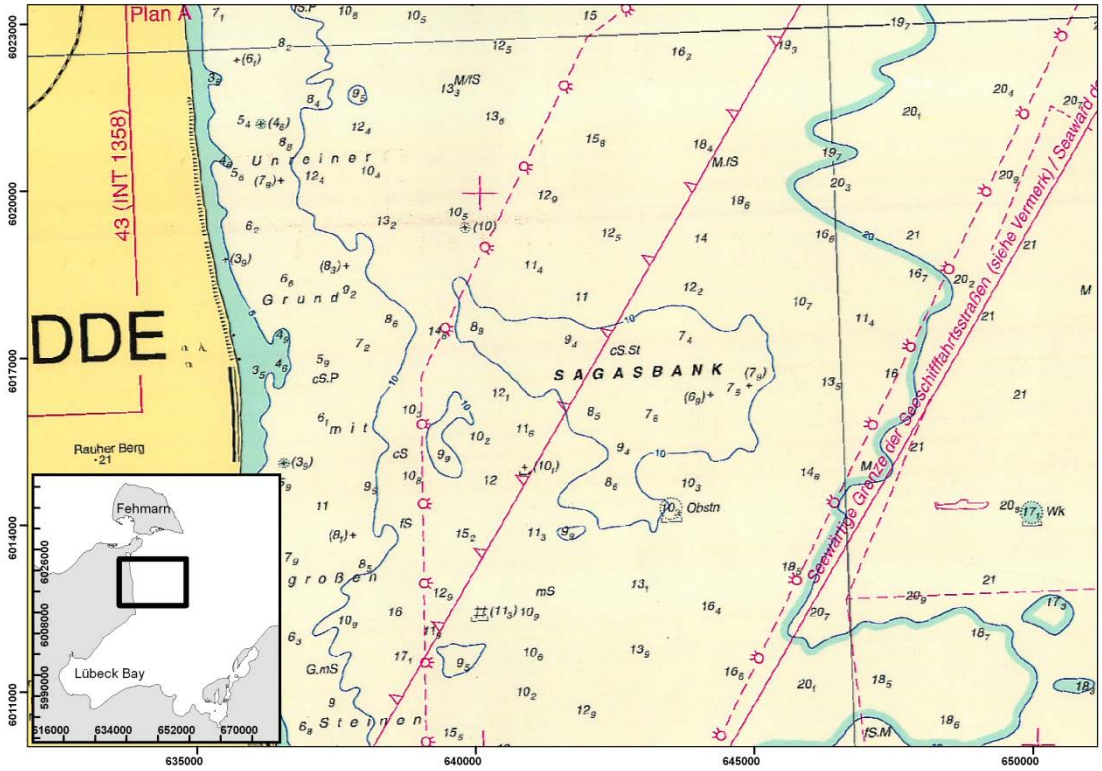

Figure 1: Overview of the area around the Sagasbank between Fehmarn Island and Lübeck Bay.

2. List of Participants

Svenja Papenmeier	chief scientist	IfG	02.04.-05.04.12
Anna Plaß	student	IfG	02.04.-05.04.12
Klaus Schwarzer	scientist	IfG	03.04.12
Helmut Beese	technician	IfG	03.04.12

3. Cruise Narrative

(all times are in UTC)

2nd April 2012:

Departure: Kiel, 06:00

Activities:
- 06:00 – 11:00 Transit to study area
- 11:00 Installation and check of scientific equipment.
- 12:00 – 14:56 SES (3 profiles)

Arrival: Burg, Fehmarn 16:10

Weather Conditions: Sunny – cloudy, NW 4 Bft, wave 0.4 m

3rd April 2012:

Departure: Burg, Fehmarn 05:15

Activities:
- 06:17 CTD-profile
- 06:54-14:35 MBES, SES, SSS, SPB (6 profiles)

Arrival: Burg, Fehmarn 15:45

Weather Conditions: Cloudy, NE 3 Bft, wave 0.2 m; in the evening NE 4 Bft, wave 0.4 m

4th April 2012:

Departure: Burg, Fehmarn 06:15

Activities:
- 6:00 Klaus Schwarzer & Helmut Beese arrived
- 7:00 return to Burg due to bad weather conditions; During mooring maneuver got a rope in the ship's propeller
- 10:30 Klaus Schwarzer & Helmut Beese left
- In the afternoon removal of the rope by scuba diver from the CAU Kiel
- 15:00 Transit to Heiligenhafen

Arrival: Heiligenhafen 16:00

Weather Conditions: Cloudy, E/NE 6-8 Bft, wave 1.5 m

5th April 2012:

Departure: Heiligenhafen

Activities:
- 06:06 CTD-profile
- 06:25-9:58 MBES, SES, SSS, SPB (3 profiles), West of Fehmarn
- 10:00 – 13:00 Transit & de-installation of scientific equipment

Arrival: Kiel, 13:00

Weather Conditions: Sunny, NE 3-4 Bft, wave 0.2 m

4. Equipment

4.1 Side scan sonar (SSS)

To obtain high resolution sonographs of the sea floor the side scan sonar unit of the C3D (Teledyne Benthos) system was used. The device was towed behind the vessel in water depth of approximately 5 - 6 m running with a towing speed of 5 knots. The frequency of the device is 200 kHz. The survey was run with a range of 100 m to each side applied. Data were recorded and mosaiced with the Isis SONAR software “Triton Elics”.

4.2 Sub bottom profiler (SBP)

Seismic data were recorded with the sub bottom installed in the the C3D unit (Teledyne Benthos). The data were acquired in a low chirp frequency mode (1.5-10 kHz).

4.3 Multibeam echo sounder (MBES)

Multibeam surveys were performed with shipboard SeaBeam 1185 (L3-Communications, ELAC Nautik GmbH), which operates with a sonar frequency of 180 kHz. The system collects bathymetric and backscatter data simultaneously with a swath width of 153.5°. The profiles were run with a vessel speed of 5 knots. The data was acquired and recorded using the software Hydrostar (L3-Communicatioins, ELAC Nautik GmbH).

4.4 Conductivity-Temperature-Depth probe (CTD)

Conductivity, temperature and depth profiles were measured with a CTD probe of Sea and Sun technology. The calculated sound velocity values are necessary to correctly record water depth values with the multibeam.

4.5 Grab sampler

Sampling for ground truthing was done with a 60 kg HELCOM standard grab sampler. Subsamples were taken for sedimentological lab analysis.

4.6 Underwater video

For optical ground truthing an underwater video camera of type Mariscope Micro was used. The device was dragged from the research vessel a few decimetres above the sea floor. The video images are transferred via a coax-cable to a monitor in real-time. The images were stored on a hard disk.

5. Performed work and preliminary results

During this cruise the southern part of the Sagasbank was mapped by 6 hydroacoustic profiles (SSS, SBP, SES, MBES) comprising an area of approximately 14 km² (red rectangle in Figure

2). Additionaly, three profiles in the area of the first leg (February 2012) were recorded with the SES to compare those ones with SBP.

The side scan sonar data complement the data of the first leg. Near the shore and east of the Sagasbank (up to 20 metre water depth) high backscatter was observed, associated with hard substrate like rocks, stones and gravel. These so called residual sediments originate from the last glacial period (Schwarzer et al., 2008). West of Sagasbank a sharp transition between high backscatter (hard substrate) and medium to low backscatter (sandy deposits) is existing. Below 20 meter water depth low and very homogenous backscatter was observed representing mud deposits which are typical for “deeper” water regions in the western Baltic Sea (Schwarzer & Diesing, 2006).

Similar to the first cruise data from sub bottom profiling shows a backfilled sub bottom channel which runs approximately in north-south direction between the 10 meter contour line east of the shore and Sagasbank. The channel cuts up to 7 meter into the sub bottom.

Multibeam data are not processed so far. The surveyed area is due to a track distance of 180 meter not full covered. The mathymetric map, calculated from the water depth of the SES, highlights the plateau of Sagasbank (Figure 3). Close to the shore a 3.5 metre deep channel exists, orientated in north-south direction.

At the last day of the cruise measurements were done west of Fehmarn island due to bad weather conditions (Figure 4). Hydroacoustic data complement data of earlier surveys.

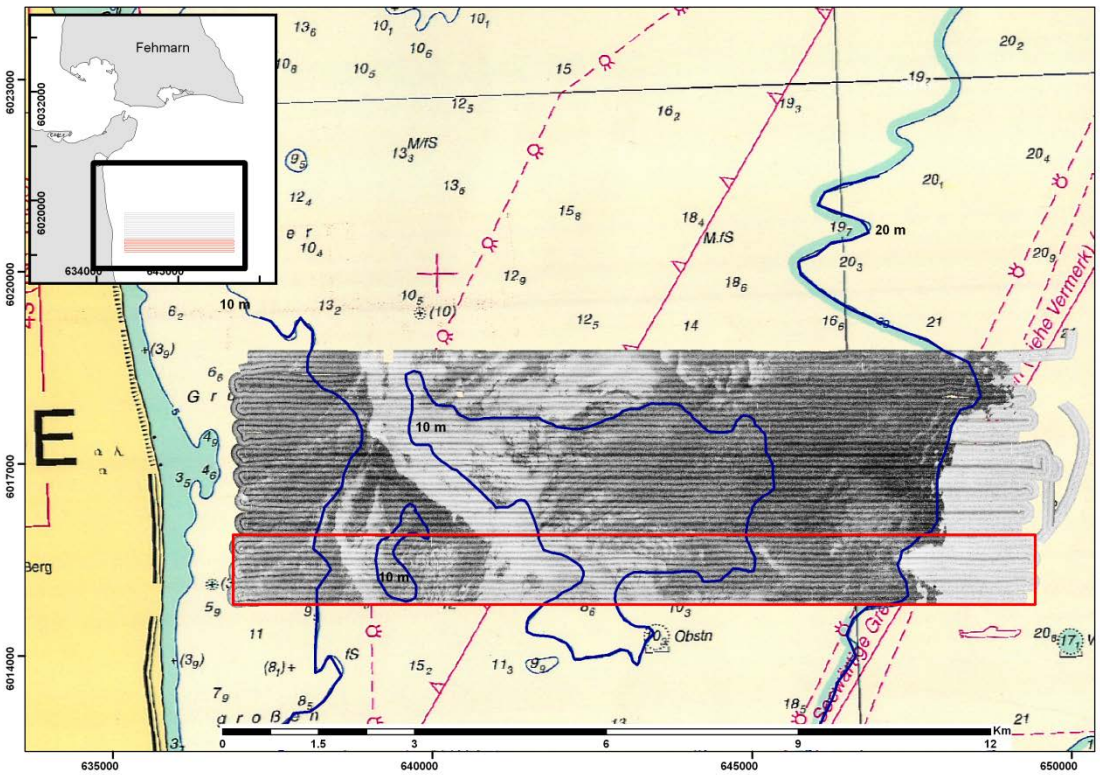

Figure 2: Side scan sonar mosaic (red rectangle) mapped together with data of the first leg (27.02.-02.03. 2012).

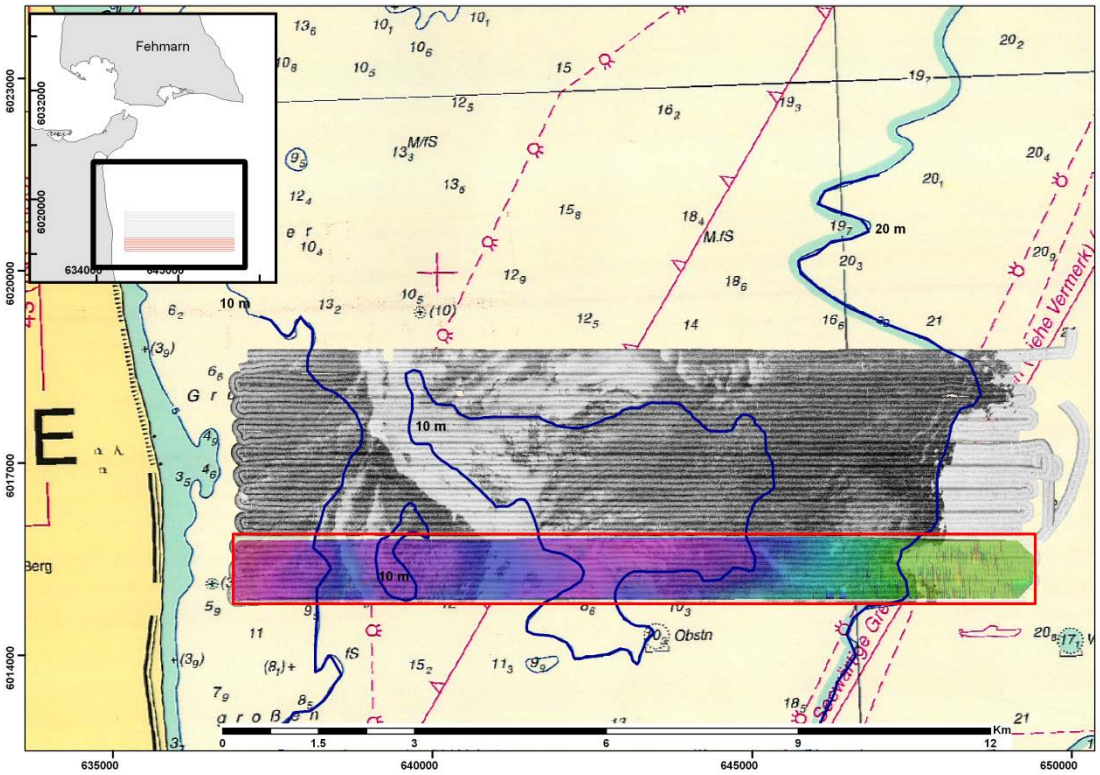

Figure 3: Side scan sonar mosaic with bathymetric map (originating on SES data).

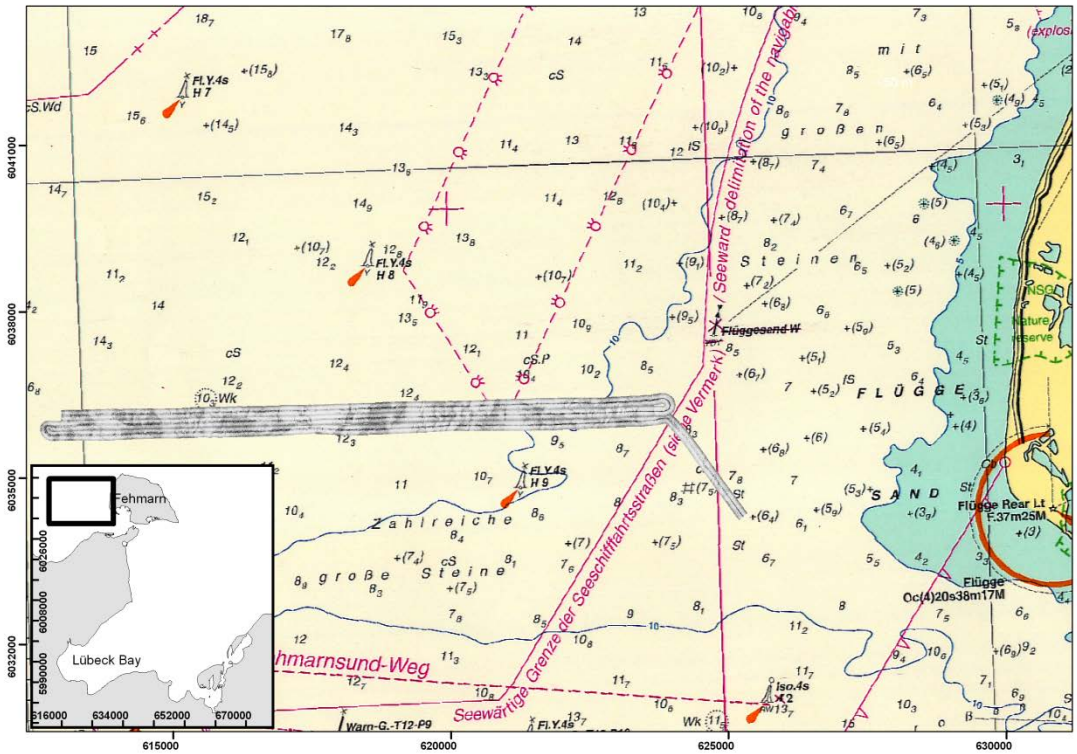

Figure 4: Side scan sonar mosaic (red rectangle) west of Fehmarn.

6. Conclusion

Hydroacoustic measurements were run with good to excellent data quality. Hard substrate, which present habitat for sea grass, algae, macro-zoobenthos and fishes, was found also beyond the Sagasbank up to 20 metre water depth. The hard substrate area is not jet completely mapped. Additional profiles in the north and south are necessary to record the entire hard substrate area.

7. Acknowledgements

We would like to thank master (B. Brockmann) and crew of RV LITTORINA for giving us all kind of support during this cruise.

8. References

Schwarzer, K. and Diesing, M. (2006): Abschlussbericht – Erforschung der FFH-Lebensraumtypen Sandbank und Riff in der AWZ der deutschen Nord- und Ostsee.

Schwarzer, K., Themann, S. and Krause, R. (2008): Abschlussbericht – Zusammenstellung der marinen Lebensraumtypen nach FFH. Institut für Geowissenschaften, Christian-Albrechts-Universität zu Kiel, 29 p.

9. Apendices

Coordinates are in UTM (WGS82, 32N)

9.1 Hydroacoustic profiling

Sagasbank

Nr.	Date	Time (UTC)	Longitude	Latitude	Comment
1	02.04.2012	12:04	637105	6016324	Profil start, only SES
2	02.04.2012	12:57	649143	6016324	Profil end, only SES
3	02.04.2012	13:04	649143	6016144	Profil start, only SES
4	02.04.2012	13:58	637105	6016144	Profil end, only SES
5	02.04.2012	14:04	637105	6015964	Profil start, only SES
6	02.04.2012	14:56	649143	6015964	Profil end, only SES
7	03.04.2012	6:54	649143	6015784	Profil start
8	03.04.2012	8:09	637105	6015784	Profil end
9	03.04.2012	8:12	637105	6015604	Profil start
10	03.04.2012	9:24	649143	6015604	Profil end
11	03.04.2012	9:28	649143	6015424	Profil start
12	03.04.2012	10:43	637105	6015424	Profil end
13	03.04.2012	10:47	637105	6015244	Profil start
14	03.04.2012	11:59	649143	6015244	Profil end
15	03.04.2012	12:03	649143	6015064	Profil start
16	03.04.2012	13:16	637105	6015064	Profil end
17	03.04.2012	13:19	637105	6014884	Profil start
18	03.04.2012	14:34	649143	6014884	Profil end

West of Fehmarn

Nr.	Date	Time (UTC)	Longitude	Latitude	Comment
1	05.04.2012	6:34	623637	6036034	Profil start
2	05.04.2012	7:45	612986	6036034	Profil end
3	05.04.2012	7:45	612986	6036214	Profil start
4	05.04.2012	8:53	623637	6036214	Profil end
5	05.04.2012	8:53	623637	6036394	Profil start
6	05.04.2012	9:58	612986	6036394	Profil end

9.2 CTD Profiling

Sagasbank

Name	Date	Time (UTC)	Longitude	Latitude	Comments
20120403_001	03.04.2012	06:17	652203	6022770	

West of Fehmarn

Name	Date	Time (UTC)	Longitude	Latitude	Comments
20120405_001	05.04.2012	06:06	625319	6034279	